Training on Waveform Archive Access and Administration

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Section 2.4 - GEOFON

November 2015

Outline

❶ General features of the services

❷ Station

❸ Dataselect

❹ Event

Section 1

General features of the services

What are the FDSN web services?

Interfaces for the exchange of time series data, related metadata, event parameter

Namely,

Station: metadata in StationXML and alternate formats.

Dataselect: raw time series data in miniSEED format.

Event: parametric data for events in QuakeML and alternate formats.

Where do we find the web service?

<site>/fdsnws/<servicename>/<majorversion>/

<site>: domain name of the hosting WS (top institutional level),

<service>: name of the service, as in the previous slide,

<majorversion>: first number describing the WS version.

For instance, http://geofon.gfz-potsdam.de/fdsnws/dataselect/1/

How do version numbers work?

<SpecMajor>.<SpecMinor>.<Implementation>

<SpecMajor>: same number implies backward compatibility with prior releases.

<SpecMinor>: incremented if optional parameters are added (backwards compat.)

<Implementation>: integer specific for the datacentre.

SpecMajor and SpecMinor imply a minimum expected behaviour.

Common methods for services

All services must support the following methods:

query: to submit data or information request.

version: to request the full service version.

application.wadl: to request a Web Application Description Layer from the service.

Every service should specify parameters for each method.

Important error codes

204 No data - The request was properly formatted but no data was found.

400 Bad Request - Wrong parameter, wrong values, etc.

401 Authorization required - Data is restricted.

404 No data - Alternative error code if 'nodata' parameter is set.

413 Too much data - Proper request but result is too large.

414 URI too large - A maximum of 2000 characters are allowed from specification.

500 Internal Server Error

513 Temporary unavailable - Maintenance mode.

Take into account that some error codes will not be visible from a browser, but yes from a command-line tool like "wget".

Use of wildcards and lists

The channel parameters (net, sta, loc, cha) can contain wildcards:

* matches zero to many characters.

? matches exactly one character.

item1,item2,item3 specifies multiple items (they can include wildcards).

Time parameter values

All time values are expressed in UTC and use a variation of ISO 8601.

YYYY-MM-DDTHH:MM:SS.ssssss Date and time values are separated by a "T".

YYYY-MM-DDTHH:MM:SS Microseconds are considered to be 0.

YYYY-MM-DD All components of time are considered to be 0.

Blank location identifier

Usual source of problems

A blank location code in SEED is represented as two space characters (ASCII 32). However, it is recommended to encode this as two minus characters ('--').

Parameters for the "query" method

starttime   Epochs starting on or after the specified start time.

endtime   Epochs ending on or before the specified end time.

network   Network code. Multiple codes are comma-separated.

station   Station code. Multiple codes are comma-separated.

location   Location code. Multiple codes are comma-separated. Be carefull with blank IDs!

channel   Channel code. Multiple codes are comma-separated.

minlatitude   Latitude larger than or equal to the specified minimum.

maxlatitude   Latitude smaller than or equal to the specified maximum.

minlongitude   Longitude larger than or equal to the specified minimum.

maxlongitude   Longitude smaller than or equal to the specified maximum.

level   Level of details for the results.

Controlling the level of detail

Parameter "level"

Controls the amount of detail included in the returned results with the following hierarchy:

Network
↪ Station
    ↪ Channel
        ↪ Response

For instance, if level=station there will be no channel or response information.

Optional parameters

format Format of result, either 'xml' (default) or 'text' (defined below). If this parameter is not specified the service must return StationXML.

startbefore Epochs starting before the specified start time.

endbefore Epochs ending before the specified end time.

startafter Epochs starting after the specified start time.

endafter Epochs ending after the specified end time.

latitude Latitude to be used in a radius search.

longitude Longitude to be used in a radius search.

minradius Stations within the specified minimum number of degrees from the geographic point defined by the latitude and longitude parameters.

maxradius Stations within the specified maximum number of degrees from the geographic point defined by the latitude and longitude parameters.

How to construct a URI

<site>/fdsnws/station/1/query?<key=value>&<key=value>...

site Domain name of the datacentre

key Parameter name from the list in the previous slide.

value Value associated to the parameter (or list of comma-separated values).

Output formats - Text

When level = network

Network|Description|StartTime|EndTime|TotalStations

http://geofon.gfz-potsdam.de/fdsnws/station/1/ ↩
query?net=CX&format=text&level=network

When level = station

Network|Station|Latitude|Longitude|Elevation|StartTime|EndTime

http://geofon.gfz-potsdam.de/fdsnws/station/1/ ↩
query?net=CX&format=text&level=station

Output formats - Text

When level = channel

Network|Station|Location|Channel|Latitude|Longitude|Elevation|Depth|
Azimuth|Dip|SensorDescription|Scale|ScaleFrequency|ScaleUnits|
SampleRate|StartTime|EndTime

http://geofon.gfz-potsdam.de/fdsnws/station/1/ ↩
query?net=CX&format=text&level=channel

No level = response

Error!

Output formats - XML

Let's see a live demo!

Parameters for the "query" method

starttime Time series samples starting on or after the specified start time.

endtime Time series samples on or before the specified end time.

network Network code. Multiple codes are comma-separated.

station Station code. Multiple codes are comma-separated.

location Location code. Multiple codes are comma-separated. Be carefull with blank IDs!

channel Channel code. Multiple codes are comma-separated.

How to construct a URI for the GET method

<site>/fdsnws/dataselect/1/query?<key=value>&<key=value>...

site	Domain name of the datacentre
key	Parameter name from the list in the previous slide.
value	Value associated to the parameter (or list of comma-separated values).

Try in Linux with a browser

http://geofon.gfz-potsdam.de/fdsnws/dataselect/1/query

net=GE&sta=BNDI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00

net=GE&sta=LUWI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00

net=GE&sta=MMRI&cha=BHZ&start=2015-11-04T03:43:00&end=2015-11-04T03:47:00

The POST method

\<site\>/fdsnws/dataselect/1/query

File to be sent via POST

NET STA LOC CHA STARTTIME ENDTIME
NET STA LOC CHA STARTTIME ENDTIME
NET STA LOC CHA STARTTIME ENDTIME

The POST method

<site>/fdsnws/dataselect/1/query

File to be sent via POST

GE BNDI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00
GE LUWI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00
GE MMRI * BHZ 2015-11-04T03:43:00 2015-11-04T03:47:00

Try in Linux with wget

wget –post-file=reqJakarta.txt "http://geofon.gfz-potsdam.de ↩
/fdsnws/dataselect/1/query" -O eventJakarta.mseed

Parameters for the "query" method

starttime Events starting on or after the specified start time.

endtime Events ending on or before the specified end time.

minlatitude Latitude larger than or equal to the specified minimum.

maxlatitude Latitude smaller than or equal to the specified maximum.

minlongitude Longitude larger than or equal to the specified minimum.

maxlongitude Longitude smaller than or equal to the specified maximum.

mindepth Depth larger than or equal to the specified minimum.

maxdepth Depth smaller than or equal to the specified maximum.

minmagnitude Magnitude larger than or equal to the specified minimum.

maxmagnitude Magnitude smaller than or equal to the specified maximum.

orderby time, time-asc, magnitude, magnitude-asc.

How to construct a URI

<site>/fdsnws/event/1/query?<key=value>&<key=value>...

site Domain name of the datacentre

key Parameter name from the list in the previous slide.

value Value associated to the parameter (or list of comma-separated values).

Try in Linux with a browser

http://service.iris.edu/fdsnws/event/1/query?minmagnitude=4& ↩
orderby=magnitude&start=2015-11-04&end=2015-11-05&format=text

Thanks a lot for your attention!